The Maryland Fruit Grower

June, 1936

Maryland State
Horticultural Society

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RECENT VIEWPOINTS ON ORCHARD FERTILIZERS AND SOIL MANAGEMENT PRACTICES

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Fertilizer Practice.—For about a quarter of a century the prevailing practice for orchard fertilization in America has been "nitrogen-only" treatment annually. This applies to practically all fruits but particularly the tree fruits. The practice was based upon a large number of experiments covering the northern states from Maine to Washington. In practically all (not quite all) the outstanding results were secured from nitrogen and whether used alone or in combination with other elements made little or no difference. The question came to revolve about time of application (fall vs. spring), quantity per tree, area of land to be covered, carriers of nitrogen, and like problems.

The prevailing recommendation is to apply one-quarter of a pound of nitrate of soda, or an equivalent amount of nitrogen in some other carrier, for each year of the tree's age until ten or fifteen pounds have been reached. For peaches it is commonly one-third of a pound for each year of age until about five pounds have been used. Heavier applications than these do not appear warranted and in some cases have been depressing. Our own work in Ohio at present, fails to show significant gains for anything except nitrogen. Despite these results, there is a growing feeling that a complete fertilizer, particularly potash and nitrogen, may be needed in many orchards.

In any event, better cover crops or intercrops seem to be desirable and this can be done only by the use of a complete fertilizer at least every two or three years, between the rows of trees. In other words, it becomes an agronomic problem. Hence our recommendation is to use complete fertilizer over the whole orchard area and nitrogen alone beneath the trees. As soon as evidence warrants it, changes in these recommendations will be made.

Fall fertilization of orchards appears to be on the increase. There is ample evidence that at least equally good results can be secured if the fertilizer is applied from the middle of September to the middle of November and without injury to the trees. Earlier applications in the spring would seem desirable, especially in sod orchards in order to avoid competition with actively growing grass.

Soil Management Practices.—Several situations have stimulated renewed interest in orchard culture problems. Among these are the very dry seasons of 1931 and 1934. Extremely wet seasons would do the same. The dying of trees has focused attention on orchard soils and what constitutes a good soil for fruit trees. The comparatively low yields per tree and lack of uniformity of bearing are particularly focusing attention on these soil practices.

We might first inquire as to what should be accomplished by any system

of orchard culture. It should be emphasized that there is usually not one way only of securing these benefits. One system of culture may be desirable under one set of conditions and another elsewhere. Back of it all a healthy, long-lived, productive tree is the aim.

Sod.—There are objections to this system but not all about it is bad. The charges against it are that neglect is not far removed from the sod system. Nitrates are low, and as a rule, competition for them between grass roots and the trees is great. Moisture may be greatly reduced or it may not be appreciably affected, depending upon the conditions. Certain insect pests are worse. On the other hand, if the sod is not heavy, if fertilization is religiously practiced, fairly satisfactory yields are secured. Certainly erosion is prevented which is a cardinal point in the soil management of hill lands. When some tool like weed hog is used in these orchards part of the objection is overcome.

Mulch.—The mulch system usually consists in keeping the orchard in sod but at all events the area beneath the trees is kept covered with straw, hay, or litter of some sort to a sufficient depth as to prevent practically all grass growth beneath it. This plan is fundamentally different from sod although it looks a bit like it. To simply mow the grass and let it lie where it falls is not sufficient. In my opinion there never has been a time when it was in as great favor throughout the East as at present.

The principal disadvantages are lack of mulch material in most orchard sections, and the hazards from rodents and fire. The objections from the standpoint of insects are less than formerly because of new methods of control. It is always wise to guard against fires by plowing fire breaks, and against rodents by regularly setting poison baits, and keeping a good dog.

Tillage and Cover Crops.—It has long been recognized that clean tillage without incorporating a green crop or manure is not good for an orchard. This is different from a fallow in which the land lies idle a year which has often proven highly beneficial.

The purpose of a cover crop is to furnish green manure or organic matter to the soil, to supply nitrogen, utilize soluble nutrients that might otherwise be lost, help present erosion, and hold snows in winter as a means of preventing deep freezing, build up the organic matter, increase water holding capacity, improve the physical condition of the soil, and others. Just how far a cover crop will accomplish these results is being questioned in some quarters. Any system of cultivating the land increases the rate of loss or oxidation of organic matter.

Probably the briefest statement that can be made is to say that a soil well supplied with organic matter is better than one in which it is low. If a cover crop system or tillage system is to be followed, as is often desirable, a heavy crop should be plowed in rather than a meager one. But one should be selected that will not be an excessive drain on the soil moisture.

ANNUAL PROCEEDINGS

The Proceedings of the 1936 Meetings of the Maryland State Horticultural Society have been mailed to paid-up members of the Society. Mistakes may occur, and if dues have been paid, and Proceedings not received, write A. F. Vierheller, College, Park, Md.

BULLETIN ABSTRACTS

Bulletins of general interest to fruit growers have been summarized by various members of the Department of Horticulture, University of Maryland, for growers' information regarding recent investigations.

"Heavy Mulching in Bearing Apple Orchards." **By J. K. Shaw and L. Southwich.—Mass. Exp. Sta. Bul. 328, March 1936.**

Fifteen years of observation and records on mulching compared with a cultivation-cover crop system on McIntosh and Wealthy varieties are reported in this Massachusetts bulletin. A low-grade hay was used as the mulching material. Approximately one pound of air-dried material per square foot of the area covered was applied each year. During the last six years of the experiment the cultivated plots were given an annual application of nitrate of soda at the rate of 300 pounds per acre because the trees in the cultivated blocks were apparently losing vigor.

The results show that both growth and yield were greater under the mulch system. The application of nitrate of soda to the cultivated plots increased growth and yield, particularly with McIntosh; however, even with the addition of nitrogen the production did not equal that of the mulched plots.

After the first three years of mulching a very marked accumulation of soil nitrates under the mulch was evident. Under the mulch soil nitrates were high not only during the growing season but continued high during the fall and early winter period.

Soil moisture studies indicated that the moisture-conserving effect of the mulch was most apparent in the dry periods of mid-summer. The heavy mulch also proved valuable in reducing water loss through run-off during heavy rains and in preventing soil erosion.—Abstracted by I. C. Haut.

"Soil Maisture and Irrigation Investigations in Eastern Apple Orchards". **By J. R. Magness, E. S. Degman, and J. R. Furr.—U. S. Dept. Agriculture. Technical Bul. 491, October, 1935.**

This work, carried on in some western Maryland orchards during the years 1930 to 1933 inclusive, made a detailed study of the relation of soil moisture to fruit size and growth, tree yields, fruit color, fruit bud formation, leaf function and regularity of bearing. Apples increased in size at a steady rate during the season except during periods of moisture shortage when growth of the fruit was measurably slowed down, reducing final size as much as 50%. With shallow soils 2 to 2½ feet in depth, *each season* had some period or periods when sufficient soil moisture was not available to the tree and trees suffered accordingly. Even with a deeper soil with roots to 6 feet depth or more, a continued dry spell affected part of the root system and fruit size was reduced. On the shallow soil two weeks without rain was sufficient to reduce fruit size. Fruit color, especially in quality of color, was adversely affected by dry periods. Rain during the latter half of the season was favorable to color development. Use of irrigation was effective in maintaining the fruit and tree responses without check except on a shallow soil of 1½ foot depth with limited water holding capacity. Mulch with straw also was somewhat effective in off-setting water shortage especially by aiding the penetration of rains. Too much irrigation in a season of good rainfall was harmful to color and fruit bud formation on trees irrigated in previous years. Annual bearing was not induced by irrigation although tree vigor, fruit yield and leaf function were maintained at a high point. It was noteworthy that

Oldenburg (Duchess) did not show marked differences in tree and fruit responses. Some extracts of this excellent bulletin follow:—

"The results indicate that fruit growth will occur in apples until the tree is permanently wilted through the rate is greatly reduced as the moisture supply to the tree becomes very limited."

"From the data in table 1 it is apparent that the yield of the irrigated Rome Beauty trees per 100-cm^2 trunk area during the 4-year period has exceeded that of the nonirrigated trees by more than 54 per cent."

"Size of fruit on the mulched irrigated trees exceeded that on the nonirrigated mulched trees by approximately 32 per cent. The average size of the fruit on the nonirrigated mulched trees was 21 per cent larger than on the nonirrigated cultivated trees."

"The trees of the Oldenburg mulched and irrigated plot were more productive and the fruit averaged slightly larger than in the cultivated plot under irrigation."

"Since soil under eastern orchard conditions is likely to be saturated with moisture at the start of the growing season, varieties ripening in July or early August have a much better chance of reaching the fruit harvest season without suffering from shortage of moisture than do varieties that carry their fruit throughout the summer."

"On the other hand, during seasons when the fruit ripened with the moisture content of the soil at or very near the wilting percentage, the color development of the fruit was poor and dull as compared with that which received sufficient moisture. Apparently moisture available to the tree is essential to the highest color development, but excessive moisture in the soil is unfavorable and is likely to lead to poor color development."

"Under actual conditions as they existed during the 4 years, the growth rate of fruit on trees bearing a full crop generally was reduced following not more than 2 weeks of midsummer weather without rainfall."

"These results indicate that under the conditions prevailing in the Middle Atlantic States and States westward having similar length of season and temperatures it is extremely hazardous to attempt to grow orchards on soils as shallow as 2 feet, even though they are retentive of moisture, of good fertility, and well drained. It would seem that the economic limit for orchard soils of good water-holding capacity, where orchards in that region are to be grown without irrigation, would be not less than 3 feet of good soil".

"Unless the soil is of good water-holding capacity with at least 10 to 12 per cent of available moisture between the field capacity and the wilting percentage, even more than 4 feet of depth would be required to assure fairly dependable moisture conditions."

"A study of the results shown in figures 3 to 5 indicates that Rome Beauty apples were somewhat larger each season on the nonirrigated mulched plot than on the nonirrigated cultivated plot, and Oldenburg apples from the mulched plot were larger most of the years."

"There is enough good orchard land in the Eastern States which is sufficiently deep and retentive of moisture to produce the needed fruit crops of the country without irrigation. It seems doubtful if new orchards should be planted where irrigation is necessary unless condi-

tions of water availability prevail.

"On the other hand, many orchards are now established on soils where moisture supply will frequently be a limiting factor in fruit production. With such orchards, if planted to good varieties and on good locations, irrigation is worthy of consideration if a dependable water supply is available. The main considerations should be the quantity of water available and the cost of distributing it in the orchard."

"On the other hand, 2 acre-inches of water, or approximately 54,000 gallons, would represent the minimum application per acre per month which might be considered as satisfactory in a supplementary irrigation system."

"A very valuable index is the wilting of relatively shallow-growing plants in the orchard. When shallow-growing vegetation becomes wilted, and particularly if it remains so during the cooler parts of the day, it is an indication that the soil in the root zone of those plants is at or near the wilting percentage. After that condition is reached it will not be long until the trees also begin to suffer unless moisture is applied."—Abstracted by A. Lee Schrader.

"Was that your cat making that terrible racket last night?"
"Yes. She ate the canary yesterday and decided that she could sing."

Mother: "Well, I suppose my little boy has been as good as gold all day?"
Nurse: "No'm, not exactly. He went off the gold standard about noon, ma'ah."

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